IMPACTS OF USING DYNAMIC FEATURES TO DISPLAY MESSAGES ON CHANGEABLE MESSAGE SIGNS

PURPOSE

Several of the State departments of transportation (DOTs) that currently operate changeable message signs (CMSs) are using dynamic features to display messages. These dynamic features include: 1) flashing an entire one-phase message; 2) flashing one line of a one-phase message; and 3) alternating text on one line of a two-or-more-line CMS while keeping the other line(s) of text constant on the second phase of the message.

Some state DOT personnel speculate that continuously flashing certain one-phase messages (typically those that describe significant traffic disruptions downstream) or flashing one line of a one-phase message (typically the top problem statement line) emphasizes that the message is especially important to drivers and should be heeded. Another operating practice by some DOTs is to format a two-phase message in such a way that the top two lines of the message remain constant and a third (bottom) line is alternated between two separate message line phrases. In essence, the CMS operates as if displaying a two-phase message, although only the bottom line actually changes. It was not clear whether such practices have any adverse effects on message reading times, driver comprehension, or driver preferences.

Previously, only one other study had been conducted to address these issues. The study was conducted in six cities in Texas using laptop computers. The computer laptop study results suggested that dynamic features may have adverse effects on reading time and message recall. However, that study was performed in a laboratory environment and was single-task in that the subjects were not placed under secondary loading conditions as would be common while driving on a highway. Therefore, this study was initiated to determine whether the inclusion of driver workload through the use of a driving simulator would yield similar findings.

APPROACH

Upon the recommendation of Federal Highway Administration (FHWA), the studies were conducted using the Texas Transportation Institute's Driving Environment Simulator in College Station, Texas. In addition to "driving" the vehicle on the freeway, additional driver workload was introduced via a car-following approach. A total of 64 subjects participated in the study.

IMPLICATIONS OF FINDINGS

Flashing Messages
The results of the driving simulator differed from the laptop studies. However, the fact that the average reading time for the flashing message was significantly longer than for the static message during the computer laptop study and that the comprehension for unfamiliar drivers was lower during the driving simulator study, suggests that flashing messages should not be recommended at this time. However, further research should be performed to validate this recommendation.

Flashing Line Messages
The findings were consistent between the laboratory and driving simulator studies with respect to longer average reading time and lower comprehension for the flashing line messages. These findings support the adoption of a Manual on Uniform Traffic Control Devices standard that flashing line message should not be used.

Alternating Line Messages
Average reading times for the alternating line message with redundancy during both the computer laptop laboratory study and the driving simulator study were significantly longer. This finding supports the adoption of an MUTCD standard that this dynamic mode should not be used.

BENEFITS

The research led to recommendations for changes and additions to the MUTCD to address the issues of dynamic features on CMSs.

PROJECT TEAM

A select group of Transportation Management Center (TMC) Pooled-Fund Study members, led by project champion Jeff Galas of the Illinois DOT, comprised the Impacts of Using Dynamic Features to Display Messages on Changeable Message Signs project team. They provided technical guidance and review of the project deliverables.

ADDITIONAL RESOURCES

The study approach and detailed research results are contained in the research report titled *Impacts of Using Dynamic Features to Display Messages on Changeable Message Signs.* Also contained in the report are guidance and suggested recommended practices related to dynamically displaying messages on CMSs. Major findings and conclusions of the research, recommended changes and/or additions to the MUTCD, and recommendations for further research are provided in the White Paper. These documents are available on the TMC Pooled-Fund Study website at: http://tmcpfs.ops.fhwa.dot.gov.

- Research Report, FHWA-HOT-05-069, August 2005
- White Paper, August 2005.

Other resources include:

- Letter Report: Review and Summary of Literature, January 2004.
- *Changeable Message Sign Operation and Messaging*, August 2004

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For information on the TMC Pooled-Fund Study, visit: http://tmcpfs.ops.fhwa.dot.gov

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